Configuring Data Compression Services

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Bay Networks

Bay Networks

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About This Guide

If you are responsible for configuring data compression, you need to read this guide.

If you want to	Go to
Start compression	Chapter 1
Learn about data compression services	Chapter 2
Change default settings for compression parameters	Chapter 3
Obtain information about Site Manager parameters (this is the same information you obtain using Site Manager online Help)	Appendix A

Before You Begin

Before using this guide, you must complete the following procedures. For a new router:

- Install the router (refer to the installation guide that came with your router).
- Connect the router to the network and create a configuration file (refer to *Quick-Starting Routers*, *Configuring BayStack Remote Access*, or *Connecting ASN Routers to a Network)*.

Make sure that you are running the latest version of Bay Networks Site Manager and router software. For instructions, refer to the *BayRS Version 12.10 Document Change Notice*.

Conventions

bold text	Indicates text that you need to enter, command names, and buttons in menu paths. Example: Enter **wfsm &**
	Example: Use the **dinfo** command.
	Example: ATM DXI > Interfaces > **PVCs** identifies the PVCs button in the window that appears when you select the Interfaces option from the ATM DXI menu.
italic text	Indicates variable values in command syntax descriptions, new terms, file and directory names, and book titles.
quotation marks (“ ”)	Indicate the title of a chapter or section within a book.
`screen text`	Indicates data that appears on the screen. Example: `Set Bay Networks Trap Monitor Filters`
separator (>)	Separates menu and option names in instructions and internal pin-to-pin wire connections. Example: Protocols > AppleTalk identifies the AppleTalk option in the Protocols menu.
	Example: Pin 7 > 19 > 20
vertical line (|)	Indicates that you enter only one of the parts of the command. The vertical line separates choices. Do not type the vertical line when entering the command. Example: If the command syntax is
	show at routes | **nets**, you enter either **show at routes** or **show at nets**, but not both.

Acronyms

ACK	acknowledgment
CCP	Compression Control Protocol
CPC	continuous packet compression
DDN	Defense Data Network
DLCI	Data Link Connection Identifier
DTR	data terminal ready
IETF	Internet Engineering Task Force
ILCCP	Individual Link Compression Control Protocol
ILI	Intelligent Link Interface
ISDN	Integrated Services Digital Network
ISDN BRI	ISDN Basic Rate Interface
ISDN PRI	ISDN Primary Rate Interface
LAPB	Link Access Procedure-Balanced
LCP	link control protocol
NCP	Network Control Protocol
LAN	local area network
MCE1	multichannel E1
MCT1	multichannel T1
PDN	Public Data Network
PPC	packet-by-packet compression
PPP	Point-to-Point Protocol
PVC	permanent virtual circuit
RFC	Request for Comment
VC	virtual circuit
TA	terminal adapter
WAN	wide area network
WCP	WAN Compression Protocol

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Tokyo and Japan	81-3-5402-7041

Chapter 1
Starting Compression

The quickest way to begin using data compression on your network is to enable it with the default configuration that Bay Networks software supplies. This chapter briefly introduces to Bay Networks data compression and includes the procedures for configuring compression with the default configuration values.

This chapter contains the following information:

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Summary of Bay Networks Data Compression Features	1-2
Preparing a Configuration File for Data Compression	1-4
Configuring Software Compression	1-7
Configuring Hardware Compression	1-7
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Summary of Bay Networks Data Compression Features

You can configure both software- and hardware-based compression on a circuit or line basis. Features specific to software and hardware compression follow.

Software-Based Data Compression

There are two Bay Networks software compression protocols:

- WAN Compression Protocol (WCP) -- for Point-to-Point Protocol (PPP), frame relay, and X.25 links
- Stac LZS -- for PPP links only

Note: The Hi/fn™ Stac LZS® Compression Option is not included with your initial purchase of Bay Routing Software (BayRS). Bay Networks Stac LZS® compression software incorporates LZS® licensed from Hi/fn™ and therefore must be separately purchased.

These two protocols use different Lev-Zimpel algorithms to implement compression and they provide different levels of interoperability between Bay Networks routers and routers made by other vendors.

If both ends of the connection are Bay Networks routers, use WCP as the compression protocol. If the connection is a PPP link and only one end of the connection is a Bay Networks router, use Stac LZS.

Software-based data compression works over WAN links. Specifically, WCP works with PPP, frame relay, and X.25 links, while Stac LZS works only with PPP links. Both WCP and Stac LZS work with PPP multilink. WCP also works with PPP multiline.

Software compression includes the following features:

- Compression for a Bay Networks Fast Routing Engine (FRE®) module at 4 x 128 KB/s compressed throughput, full duplex; or 512 KB/s aggregate compressed throughput
- Compression on a Bay Networks Access Node (AN®) platform at 2 x 64 KB/s compressed throughput, full duplex; or 128 KB/s aggregate compressed throughput

- Compression on all intelligent link interface (ILI) modules that support serial and ISDN BRI ports
- Support for all Bay Networks platforms: AN, Access Stack Node (ASN™), Advanced Remote Node (ARN™), Backbone Node (BN®), and System 5000™
- Compression on MCT1 and MCE1 lines

Hardware-Based Data Compression

Hardware compression uses WCP as the compression protocol and it works over WAN links running PPP and frame relay. Hardware compression is available as:

- Optional daughterboards for PPP and frame relay networks that use the octal synchronous link module for the BN, using FRE-2 processors only.
- Optional net modules for PPP and frame relay networks that use the ASN. Hardware compression can compress data transmitted over WANs attached to dual and quad synchronous, MCE1/ISDN PRI, MCT1/ISDN, dual sync with ISDN BRI, and Quad BRI net modules.

Preparing a Configuration File for Data Compression

To configure data compression, you use the Bay Networks Site Manager configuration tool. For instructions about how to work with configuration files, refer to *Configuring and Managing Routers with Site Manager.*

Before starting data compression, you should have created and saved a configuration file with at least one unconfigured WAN interface, such as a sync port or MCT1 port.

To configure this interface for compression, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. Choose **Tools.**	The Tools menu opens.
2. Choose **Configuration Manager**.	The Configuration Manager menu opens.
3. Choose **Local File**, **Remote File**, or **Dynamic**.	Site Manager prompts you for the configuration file you want to open.
4. Select the file.	The Configuration Manager window opens, displaying the router modules.

From the Configuration Manager window, proceed to the following sections to configure a WAN protocol and compression.

Configuring Software Compression

Software compression works on all router platforms and all serial interfaces. After you open a configuration file, go to the one of the following sections to enable compression.

- "Enabling Compression for PPP and Frame Relay"
- "Enabling Compression for X.25," on page 1-6

Enabling Compression for PPP and Frame Relay

To configure software compression for PPP and frame relay, begin at the Configuration Manager window and complete the tasks in the following table:

Site Manager Procedure	
You do this	**System responds**
1. Click on the link or net module connector for which you are enabling data compression.	The Add circuit window opens.
2. Accept the default circuit name or rename the circuit then click on **OK**.	The WAN Protocols window opens.
3. Choose one of these WAN protocols: • **PPP** • **Frame Relay**	Site Manager enables the protocol.
4. Click on **OK**.	The Select Protocols window opens.
5. Enable data compression according to the appropriate procedure. • For **PPP**, scroll through the Select Protocols window and choose either **WCP** or **Stac LZS.*** • For **Frame Relay**, scroll down the Select Protocols window and choose **WCP**.	Site Manager enables compression on this interface.
6. Click on **OK**.	You return to the Configuration Manager window.

* WCP and Stac LZS cannot operate on the same line. Do not configure them together on a line.

Enabling Compression for X.25

To enable WCP for an X.25 interface, you must first add an X.25 service record, then enable compression for the X.25 interface. See *Configuring X.25 Services* for information about X.25 service records.

To enable compression, complete the tasks in the following table:

Site Manager Procedure	
You do this	**System responds**
1. Click on the link or net module connector for which you are enabling data compression.	The Add circuit window opens.
2. Accept the default circuit name or rename the circuit. Click on **OK**.	The WAN Protocols window opens.
3. Choose **X.25** then click on **OK**.	The X.25 Packet Configuration window opens.
4. Enter the required information then click on **OK**.*	The X.25 Service Configuration window opens.
5. Click on **Add**.	The X.25 Service Record window opens.
6. Enter the required information then click on **OK**.*****	You return to the X.25 Service Configuration window.
7. In the X.25 Service Configuration window, choose **Protocols**.	The Protocols menu opens.
8. Choose **Add/Delete**.	The Select Protocols window opens.
9. Scroll down the Select Protocols window and choose **WCP**.	Site Manager enables compression on this interface and then returns you to the X.25 Service Configuration window.†
10. In the X.25 Service Configuration window, select **Enable** for the **Enable Compression** parameter. Do this for each X.25 interface that you configure.	Site Manager enables compression for this interface.
11. Click on **Done**.	You return to the Configuration Manager window.

* Site Manager requires that you configure certain packet and service parameters. Refer to *Configuring X.25 Services* for information about these parameters.

† At the time you enable compression, you can also enable other protocols.

Configuring Hardware Compression

To use hardware compression you must have an octal sync link module with a hardware compression daughterboard for the BN, or a hardware compression net module for the ASN.

You can use hardware compression with PPP and frame relay.

Configuring Compression for the Backbone Node (BN)

To configure hardware compression for the BN, begin at the Configuration Manager window and complete the tasks in the following table:

Site Manager Procedure	
You do this	**System responds**
1. Click on an empty slot and choose one of the following octal sync link modules with hardware compression daughterboards: • **AG2104037** • **AG2104038***	Site Manager selects the module.
2. Click on **OK**.	You return to the Configuration Manager window. The link module is added to the slot.
3. Choose a port.	The Add Circuit window opens.
4. Accept the default circuit name or enter a new name then click on **OK**.	The WAN Protocols window opens.
5. Choose one of the following WAN protocols: • **PPP** • **Frame Relay**	Site Manager selects the protocol.
6. Click on **OK**.	The Select Protocols window opens.
7. Scroll through the Select Protocols window and choose **WCP**.	Site Manager enables compression on this interface.
8. Click on **OK**.	You return to the Configuration Manager window.

* If you have a hardware compression link module on a BN, you can use hardware compression on any WAN port on a slot. Hardware compression on the BN does not work across slots.

Configuring Compression for the Access Stack Node (ASN)

To configure hardware compression for the ASN, begin at the Configuration Manager window and complete the tasks in the following table:

Site Manager Procedure	
You do this	**System responds**
1. Click on an empty slot and choose one of the following net modules for hardware compression: • **AG2104007** • **AF2104012***	Site Manager selects the net module.
2. Click on **OK**.	You return to the Configuration Manager window. The net module is added to the slot.
3. Click on same slot that contains the hardware compression module and choose a WAN net module.	Site Manager selects the WAN net module.
4. Click on **OK**.	You return to the Configuration Manager window. The WAN net module is placed over the compression module.
5. Choose a port.	The Add Circuit window opens.
6. Accept the default circuit name or enter a new name then click on **OK**.	The WAN Protocols window opens.
7. Choose one of the following WAN protocols: • **PPP** • **Frame Relay**	Site Manager selects the protocol.
8. Click on **OK**.	The Select Protocols window opens.
9. Scroll through the Select Protocols window and choose **WCP**.	Site Manager enables compression on this interface.
10. Click on **OK**.	You return to the Configuration Manager window.

* If you have a hardware compression net module on an ASN, you can use hardware compression on any WAN port on that single router or slot. Hardware compression on the ASN does not work across slots; that is, it does not provide compression for any other ASNs in the stack.

Finding Further Information

For detailed information on Bay Networks data compression, refer to Chapter 2. For information and recommendations about using nondefault values to customize compression, refer to Chapter 3.

Chapter 2
Data Compression Overview

Bay Networks data compression services enable you to reduce line costs and improve response times over wide area networks. In addition, they eliminate redundancies in data streams. When you use compression on a network, bandwidth efficiency improves so you can transmit more data.

This chapter contains the following information:

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Bay Networks Compression Services

Bay Networks compression services include:

- Software-based compression for PPP, frame relay, and X.25 networks for all router platforms and all serial interfaces. This includes PPP compression on multiline, multilink, on the ISDN BRI and PRI modules, and on lines that use Raise DTR or V.25bis modem interfaces with dial services. It also includes frame relay compression on multiline and dial backup lines.
- Hardware-based compression for PPP and frame relay networks that use the octal synchronous link module for the BN using FRE-2 processors. Hardware compression supports all of the PPP and frame relay services that WCP software compression supports.
- Hardware-based compression for PPP and frame relay networks for the ASN. A compression net module compresses data transmitted over a WAN network by dual and quad synchronous, MCE1/ISDN PRI, MCT1/ISDN, dual sync with ISDN BRI, and QBRI net modules. Hardware compression supports all of the PPP services that WCP software compression supports.

Bay Networks WCP software- and hardware-based compression interoperate fully because they use the same algorithm. Stac LZS software compression does not interoperate with hardware compression.

To use data compression effectively, you must decide how to allocate memory for this task. The goal is to compress data as much as possible and to transmit the data as quickly as possible without taxing the resources of the router.

Data Compression Architecture

WCP and Stac LZS use different compression algorithms and protocols. The compression protocol that you choose depends on whether you are communicating with routers from Bay Networks or other vendors.

Table 2-1 lists the algorithms and protocols that Bay Networks uses to provide data compression services for WCP and Stac LZS respectively:

Table 2-1. Data Compression Algorithms and Protocols

WCP	Stac LZS
LZ-77 algorithm	Stac LZS algorithm
Compression Control Protocol (RFC 1962)	Compression Control Protocol (RFC 1962)
Bay Networks proprietary compression protocol (WCP)	References the PPP Stac LZS Compression protocol (RFC 1974) as a guideline

You want to ensure that routers at both ends of the connection are using the same compression protocol. You cannot have one router using WCP compression and another router using Stac LZS compression.

If both ends of the connection are Bay Networks routers, use WCP as the compression protocol. If the connection is a PPP link and only one end of the connection is a Bay Networks router, use Stac LZS.

If you want the router to negotiate which protocol is used, set the Compression Protocol parameter (refer to page A-10 for a parameter description).

LZ-77 Algorithm

Bay Networks WCP data compression software is based on a Lempel-Ziv (LZ-77) algorithm. The algorithm uses a sliding history buffer that stores the data that the network link has processed most recently. The compressor compares new data strings with data it has already processed and stored in the buffer. When the compressor detects data strings that match data it has already processed, it replaces those strings with offset and length tokens that are shorter than the original strings, thus compressing the data.

Stac LZS Algorithm

Hi/fn™ is a wholly owned subsidiary of Stac, Inc. Bay Networks Stac LZS compression software incorporates LZS® from Hi/fn™. In this documentation the Hi/fn™ LZS® algorithm is referred to as Stac LZS.

Bay Networks Stac LZS compression software is based on the Stac LZS algorithm to transport compressed packets across a PPP link. Stac LZS implements an error detection mechanism, which means it can detect if packets are lost during transmission. Stac LZS does not retransmit packets if they are lost.

The Stac LZS compression algorithm searches incoming data for redundant data strings and replaces these strings in the outgoing data with encoded tokens of shorter length. Stac LZS creates the encoded tokens from information in a table that the Stac LZS algorithm builds. This table consists of string matches, which point to previous incoming data. As the table builds and tokens are created, subsequent data is compressed based on previous data.

Compression Control Protocol (CCP)

Bay Networks uses RFC 1962, the Compression Control Protocol (CCP) to enable or disable compression across a PPP link and determine what kind of compression is used. CCP also includes a history reset request and acknowledgment capability, which Stac LZS uses but WCP does not. WCP uses its own negotiation mechanism.

Bay Networks WAN Compression Protocol (WCP)

Bay Networks proprietary WAN Compression Protocol (WCP) is an IETF draft standard. WCP enables compression for frame relay and for X.25, and transports compressed packets for PPP, frame relay, and X.25. WCP negotiates compression mode, history size, and buffer size. For PPP and frame relay, WCP also retransmits packets in the event of packet loss, and protects against inadvertent data expansion (LAPB retransmits packets for X.25).

WCP is most effective for sites that have WAN connections at relatively low speeds such as 56/64 KB, where you want to achieve data compression at low cost, and with minimal memory requirements. WCP supports connections up to 512 KB/s on the FRE-040. For networks operating at faster speeds, you should use hardware compression.

PPP Stac LZS Compression Protocol

PPP uses CCP to negotiate how the router uses the Stac LZS, RFC 1974 compression protocol. Specifically, CCP negotiates the different compression modes that RFC 1974 supports. Bay Networks negotiates only mode 3 and the number of compression histories, of which we support only one history.

RFC 1974 is only specified as an error detection protocol, it does not contain a transmit history like WCP. Instead, it relies on upper layer protocols for to retransmit data when errors occur.

For more information on compression protocol modes, refer to RFC 1974.

Data Compression Performance

The goals in using data compression are to achieve a high compression ratio while maximizing throughput. *Compression ratio* is the size of uncompressed data compared to the size of the same data after it is compressed. *Throughput* refers to the amount of data that goes across the network in a specific amount of time. The amount of throughput can indicate the efficiency and speed of the network.

The compression ratio varies according to the effectiveness of the compression algorithm, but also according to the characteristics of the data you are transmitting. Data that includes a lot of redundant strings compresses at a high ratio.

Throughput varies with the number of devices in the network that the data must travel. Throughput is also affected by the compression and decompression process.

Hardware Compression

Bay Networks hardware-based compression works with frame relay and PPP networks. It best serves sites that support T-1 or E-1 lines, which often concentrate many lower-speed remote connections. The hardware compression facility operates at high speeds, and also supports high-density WAN connections. Use hardware compression when you want to achieve high compression ratios and throughput, and also want to preserve router memory to perform other functions.

Hardware Compression for the BN

The BN supports the following compression daughterboards:

- AG2104037 - Octal Sync with a 32-contexts hardware compression daughterboard
- AG2104038 - Octal Sync with a 128-contexts hardware compression daughterboard

Hardware Compression for the ASN

The hardware compression net modules for the ASN can compress data transmitted over WAN networks attached to dual and quad synchronous, MCE1/ISDN PRI, MCT1/ISDN, dual sync with ISDN BRI, and QBRI net modules. One compression net module in a single ASN can provide hardware compression for all the net modules on that router. It does not provide compression for any other ASNs in the stack.

The compression net module is available in both a 32-contexts and a 128-contexts version.

The ASN supports the following compression net modules:

- AF2104007 - a 32-contexts hardware compression net module
- AF2104012 - a 128-contexts hardware compression net module

Hardware Compression Contexts

A *context* refers to compression and decompression for a single virtual circuit (VC). Compression hardware maps a context to specific regions of compression and decompression memory.

If you have a 32-contexts compression daughterboard or net module, you can simultaneously run compression over 31 continuous packet compression (CPC) contexts, each using an 8 KB history size, with one shared 8 KB packet-by-packet compression (PPC) context.

If you have a 128-contexts compression daughterboard or net module, you can simultaneously run compression over 127 CPC contexts, each using an 8 KB history size, with one shared 8 KB PPC context.

The difference between the Bay Networks 32-contexts and 128-contexts daughterboards and net modules is their amount of memory. The 128-contexts daughterboard and net module have more memory -- 2 MB compression/1 MB decompression. The 32-contexts daughterboard and net module have only 512 KB compression/256 KB decompression.

Note: You should plan your network to use hardware compression on the VCs most important to you within the limits of your equipment. If you configure more VCs for hardware compression than your daughterboard or net module can support, you cannot control which VCs will use hardware compression. By default, all VCs that exceed the hardware context limit use software compression.

For more information on CPC and PPC, see Chapter 3, “Customizing Data Compression.”

How Data Compression Works

To transmit compressed data, the router must complete one or both of the following:

- CCP negotiations -- for PPP connections using WCP or Stac LZS
- WCP negotiations -- for PPP, frame relay, and X.25 connections using WCP

The following sections describe how these negotiations work. As you read these sections, refer to Figure 2-1, which illustrates CCP and WCP initialization on a PPP link. Figure 2-1 applies for Stac LZS also, but only steps 1, 3, and 4.

If compression is across a frame relay or X.25 link, the router only negotiates WCP then data transmission can take place. CCP does not apply.

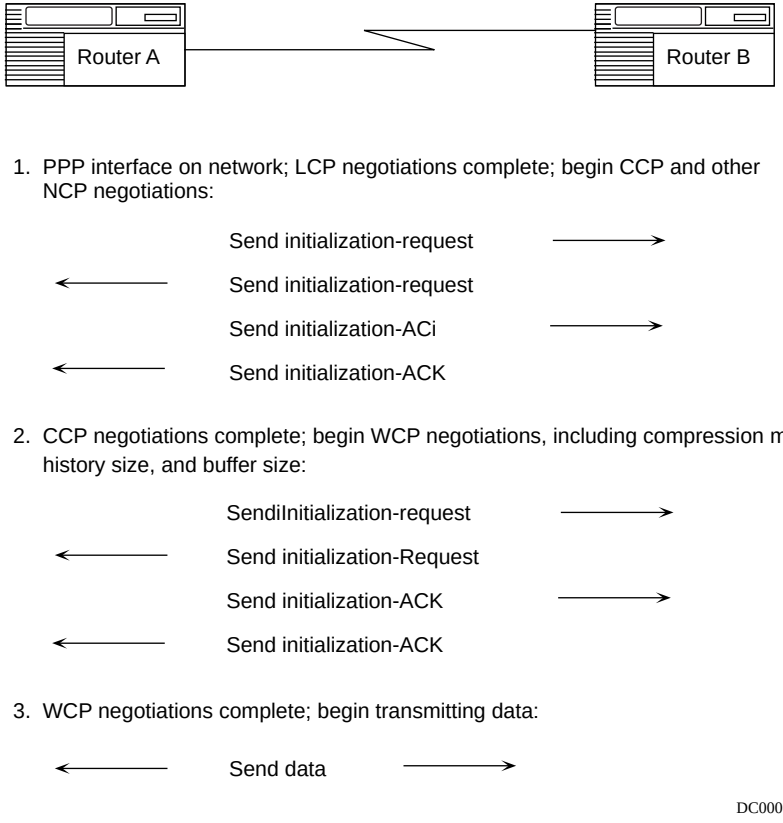

Figure 2-1. CCP and WCP Initialization on a PPP Link

CCP Negotiations

CCP allows the two ends of a PPP connection to negotiate whether to use data compression, and if so, which algorithm to use. Both WCP and Stac LZS use CCP to negotiate compression.

Note: If one side of a link requests an algorithm that the other side does not support, traffic over the link continues, but in uncompressed form.

In Figure 2-1, negotiations begin when PPP establishes a link. CCP uses the same configuration and network control protocol negotiations that the Link Control Protocol (LCP) uses to establish a link.

For Stac LZS, CCP also provides the following:

- History reset request messages
- Request acknowledgment messages

These messages help to synchronize the receipt and transmission of the compression and decompression history after a packet is lost. WCP does not use these messages.

For an explanation of LCP negotiations, refer to *Configuring PPP Services*.

WCP Negotiations

WCP allows two ends of a PPP, frame relay, or X.25 connection to negotiate compression.

Frame relay and X.25 use WCP to negotiate whether to use data compression, and which algorithm to use. (PPP uses CCP and WCP to negotiate this information.) As with PPP, if one side of a link requests an algorithm that the other side does not support, traffic continues, but in uncompressed form. All three WAN protocols use WCP to negotiate options such as compression mode, history size, and buffer size.

Each side of a link running data compression has a compressor, a decompressor, a compression history, and a retransmission buffer. When you configure compression, you can edit WCP parameters for compression mode, history size, and buffer size to optimize compression performance on your network.

Data Transmission

For PPP links using WCP, Network Control Protocol (NCP) negotiations and WCP negotiations occur simultaneously. When PPP, NCP, and WCP negotiations are complete, data transmission using compression begins.

For PPP links using Stac LZS, data transmission using compression begins when CCP and NCP negotiations are complete.

For frame relay and X.25 links, data transmission using compression begins when WCP negotiations are complete.

Compression Features for Specific Protocols

Bay Networks data compression services vary in some details according to the WAN protocols that you configure. Read the following sections to learn about how Bay Networks implementation of data compression applies to PPP, frame relay, and X.25 services.

PPP Services

You can use software or hardware data compression on all PPP circuits, including multiline (WCP only) and multilink, bandwidth-on-demand, dial-on-demand, and dial backup lines. When you use compression on a bandwidth-on-demand, dial-on-demand, or dial backup circuit, WCP automatically configures or deletes compression as lines are added to or removed from the circuit.

PPP Multiline

Multiline is a feature that enables you to configure a single circuit that consists of one or more WAN data paths. A *data path* is a logical point-to-point channel; it can be a permanent or dial-up physical line, or it can be a virtual circuit connection. Multiline provides both increased fault tolerance and greater bandwidth between two sites.

For more information about Bay Networks multiline, see *Configuring WAN Line Services.*

PPP Multilink

Multilink is a feature of PPP that provides capabilities beyond those of multiline circuits. Multilink consists of a *bundle* of lines between two peers, consisting of up to four links. Multilink can:

- Distribute traffic across the lines in the bundle in amounts roughly proportional to the effective bandwidth of each link.
- Use lines that have different speeds, proportionally distributing traffic over those lines.
- Balance traffic load and restore packet sequence.
- Use switched lines (such as ISDN-B channels) as well as leased lines.
- Monitor traffic volume.

PPP Multilink and WCP

Depending on the version of Bay Networks router software, the router handles the operation of PPP multilink and WCP differently.

For BayRS™ 12.10, by default the router negotiates WCP above the PPP multilink bundle for new circuits only. Negotiating compression *above the bundle* means that data packets are first compressed and then distributed across the links in the bundle. The distribution of traffic occurs once for the entire bundle and the balance of traffic across the bundle is more accurate. In addition, the router uses less memory for compression.

Routers using BayRS 12.10 with an older configuration file negotiate WCP below the multilink bundle by default. By negotiating compression *below the bundle*, data packets are first distributed across the links and then compressed. Compression is done individually for every link. You can reconfigure the circuit to negotiate WCP above the bundle by changing the CCP Type parameter to CCP on the routers at both ends of the link.

If you configure a new multilink circuit on a local router running BayRS Version 12.10 and the remote router is running a version earlier than 12.10, you must change the CCP Type parameter from the default to ILCCP for the local router and set the PPP Mode to multilink.

For a parameter description of CCP Type, refer to Appendix A, “Data Compression Parameters.”

PPP Bandwidth-on-Demand

Bandwidth-on-demand allows a secondary, dial-up line to augment a primary, leased line when the primary line experiences congestion. Congestion occurs when traffic volume exceeds line capacity. When congestion abates, the secondary line becomes inactive.

If you configure bandwidth-on-demand and WCP, it affects the bandwidth-on-demand congestion thresholds. These thresholds instruct the router to activate additional links from a multilink bundle to relieve congestion.

For BayRS 12.10, when WCP is negotiated above the multilink bundle and the router sends or receives data, it calculates the congestion thresholds based on compressed data. If WCP is negotiated below the bundle, the router calculates these thresholds based on uncompressed data.

If a router using software version 12.10 software is communicating with a router using software prior to version 12.10, the routers must negotiate WCP below the bundle, so the thresholds will be based on uncompressed data.

To configure these thresholds, refer to *Configuring Dial Services*.

PPP Dial-on-Demand

Dial-on-demand service enables you to establish a circuit only when you want to transmit and receive data, as opposed to having a leased line, which is always available. By using a circuit on a demand basis, you can significantly reduce your line costs.

PPP Dial Backup

PPP also allows you to configure *dial backup* service. If a primary PPP line fails and you have enabled dial backup, the router automatically establishes a backup line. You cannot enable any protocols, including compression, on a backup circuit, because a backup circuit inherits its protocols from the primary circuit. If the primary circuit uses compression, then the backup circuit does also.

For more information on Bay Networks dial services, refer to *Configuring Dial Services*.

Frame Relay Services

You can use software (WCP or Stac LZS) or hardware data compression with frame relay. You can use compression with some virtual circuits (VCs), and not with others, as you choose, both for regular frame relay VCs, and for those you configure in hybrid mode. You can also use compression with dial-on-demand and dial backup services.

You must enable compression on both sides of a frame relay link. If you enable data compression on only one side of the link, data transmission occurs, but in uncompressed form.

Frame Relay Hybrid Access

Hybrid access enables you to combine bridging and routing over a single frame relay interface.

When you enable data compression for frame relay on a hybrid circuit, both the bridged and the routed traffic over that circuit are compressed. Note that compression applies only to the hybrid permanent virtual circuit (PVC), and not to the other PVCs from the main circuit, unless you have also enabled compression for those interfaces. Conversely, if you enable data compression for other PVCs, but not on a PVC you have configured for hybrid mode, the hybrid circuit does not use compression.

Frame Relay Dial-on-Demand

Frame relay enables you to configure dial-on-demand service. *Dial-on-demand* enables the router to activate a dial-up line only when there is data to send or when you configure the router to force the activation of a dial-up line. Using frame relay dial-on-demand ensures that you establish connections only when you need them, as opposed to using leased lines, which are active regardless of data activity. This helps you reduce line costs.

Frame Relay Dial Backup

Frame relay enables you to configure *dial backup* service. If a primary frame relay circuit fails and you enable dial backup, the router automatically establishes a backup circuit. The backup circuit can be a PPP circuit, a frame relay circuit that uses direct mode (a service record with only one PVC), or a frame relay circuit that uses group mode (a service record with two or more PVCs).

The backup circuit can inherit the primary's configuration, or it can use its own. When the frame relay primary and backup use the same configuration, they have a *shared* configuration. The backup circuit uses the same network-layer address as the primary circuit. The data-link layer configuration, that is, the backup PVCs, Data Link Connection Identifiers (DLCIs), and filters can be the same or different from the primary.

If the backup uses a unique configuration, it is a *secondary* configuration. A secondary configuration uses a different network-layer address, PVCs, and filters from the primary.

To use data compression with frame relay dial backup, you must configure compression on both the primary and the backup circuit. The backup circuit does not necessarily inherit the PVC configuration from the primary circuit because the backup PVCs can have different configurations from the primary.

For further information on Bay Networks dial services, refer to *Configuring Dial Services*.

Frame Relay Multiline

Multiline is a feature that enables you to configure a single circuit that consists of one or more WAN data paths. A *data path* is a logical point-to-point channel; it can be a permanent or dial-up physical line, or it can be a virtual circuit connection. Multiline provides both increased fault tolerance and greater bandwidth between two sites.

For more information about Bay Networks multiline, refer to *Configuring WAN Line Services.*

X.25 Services

An X.25 network permits as many as 128 VCs to exist on the same physical link at the same time. You can configure each of these interfaces individually to use data compression or not.

X.25 PDN and DDN Services

When you use data compression on circuits that you configure for X.25 Public Data Network (PDN) or Defense Department Network (DDN) services, you must enable compression on both sides of the link. If you configure compression on only one side of a PDN or DDN link, the data that travels over that link will be corrupted.

You must also remember to enable the X.25 service record compression parameter for each X.25 interface that you configure. For more information about this parameter, refer to *Configuring X.25 Services.*

Adjusting X.25 Max Window Size

Window size can affect packet throughput across the X.25 network. Setting the X.25 Max Window Size parameter too low can cause the router to drop packets and render data compression ineffective. You should configure this parameter at a higher value than the default setting.

Chapter 3
Customizing Data Compression

When you enable data compression, default values are in effect for all parameters. For parameter descriptions, refer to Appendix A, “Data Compression Parameters.”

For WCP and hardware compression, you may want to change these values, depending on the requirements of your network. For Stac LZS, the only modification you can make is to disable the protocol if you enabled it.

This chapter provides information about Bay Networks compression and how to use it effectively on your network.

This chapter contains the following information:

Topic	Page
Accessing Configuration Windows	3-2
Allocating Compression Memory for WCP	3-7
Configuring Hardware Compression	3-12
Changing the Control and Compression Protocol	3-14
Disabling Compression	3-15

Accessing Configuration Windows

To customize compression, you need to access specific configuration windows that contain the parameters you want to modify. Refer to one of the following sections for instructions:

- "WCP Line Interface Parameters"
- "WCP Circuit Interface Parameters," on page 3-4
- "Stac LZS Enable Parameter," on page 3-6

WCP Line Interface Parameters

The WCP Line Interfaces List window (Figure 3-1) includes all the data compression line parameters.

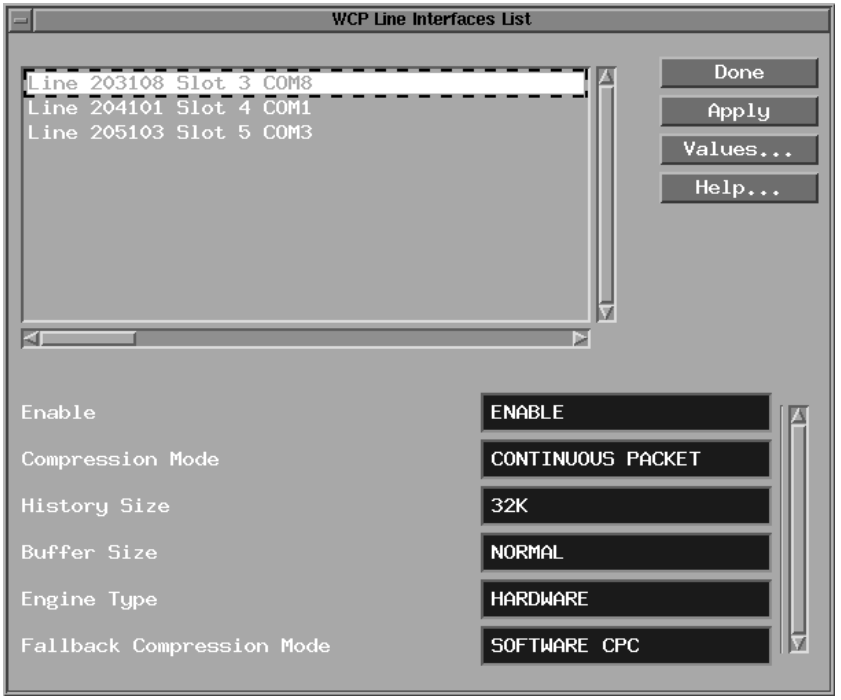

Figure 3-1. WCP Line Interfaces List Window

To access this window, complete the tasks in the following table:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Protocols**.	The Protocols menu opens.
2. Choose **WCP.**	The WCP menu opens.
3. Choose **Lines**.	The WCP Line Interfaces List window opens.
4. Edit any of the following parameters: • **Enable** • **Compression Mode** • **History Size** • **Buffer Size** • **Engine Type** • **Fallback Compression Mode** Click on **Help** or refer to the parameter descriptions beginning on page A-1.	Site Manager changes the parameter value.
5. Click on **Done**.	You return to the Configuration Manager window.

WCP Circuit Interface Parameters

The WCP Circuit Interfaces List window (Figure 3-2) includes the data compression circuit parameters.

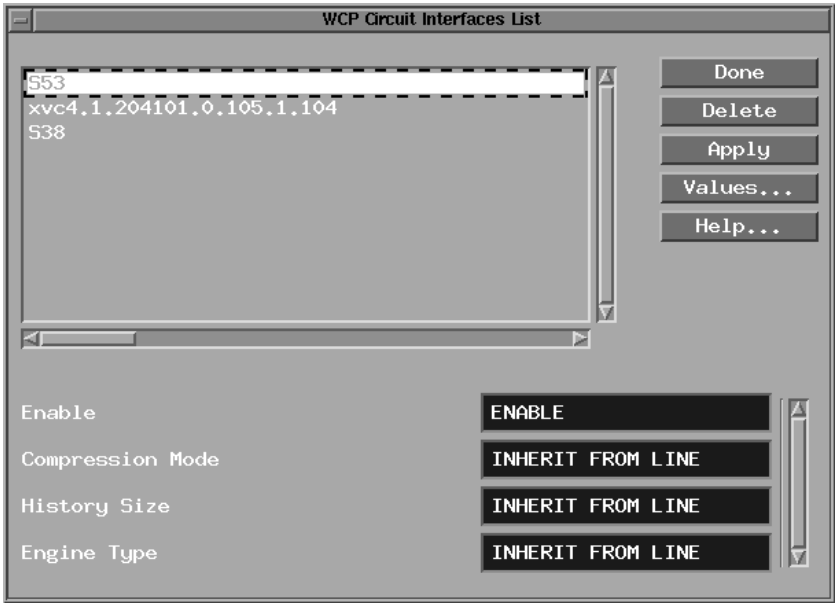

Figure 3-2. WCP Circuit Interfaces List Window

To access this window, complete the tasks in the following table:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Protocols**.	The Protocols menu opens.
2. Choose **WCP.**	The WCP menu opens.
3. Choose **Interfaces**.	The WCP Circuit Interfaces List window opens.
4. Edit any of the following parameters: • **Enable** • **Compression Mode** • **History Size** • **Engine Type** Click on **Help** or refer to the parameter descriptions beginning on page A-6.	Site Manager Changes the parameter value.
5. Click on **Done**.	You return to the Configuration Manager window.

Stac LZS Enable Parameter

The Stac LZS Interface List window (Figure 3-3) includes the Enable parameter.

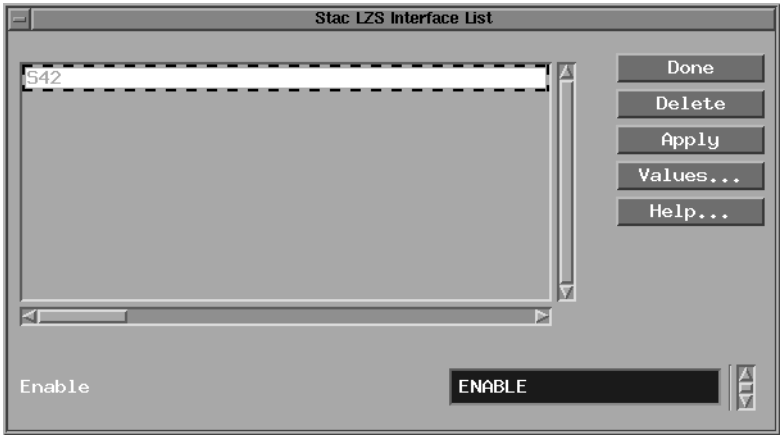

Figure 3-3. Stac LZS Interface List Window

To access this window, complete the tasks in the following table:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Protocols**.	The Protocols menu opens.
2. Choose **Stac LZS**.	The Stac LZS menu opens.
3. Choose **Interfaces**.	The Stac LZS Interfaces List window opens.
4. Edit the **Enable** parameter. Click on **Help** or refer to the parameter descriptions beginning on page A-8.	Site Manager changes the parameter value.
5. Click on **Done**.	You return to the Configuration Manager window.

Allocating Compression Memory for WCP

Using WCP across a network involves allocating memory to maximize compression without taxing the resources of your system. You can select

- A compression mode, to maximize compression ratio.
- A history size, to maximize throughput.
- A buffer size, to prevent data loss.

Maximizing Compression Ratio

You can compress data in one of two modes:

- *Continuous packet compression (CPC)* maintains compression history across packets. CPC yields a higher compression ratio than does packet-by-packet. In most circumstances, you should select CPC, the default value, to maximize compression.
- *Packet-by-packet compression (PPC)* creates a new history for each packet. PPC yields a lower compression ratio than does CPC. Select PPC only for links that drop a very large number of packets. Be aware that under these circumstances, implementing data compression may offer little or no advantage.

  If either side of the link specifies PPC, both sides of the link use PPC.

Modifying the Compression Mode

To determine the mode that the router uses to compress data, modify the Compression Mode parameter.

To modify this parameter for the line, access the WCP Line Interfaces List window. To modify this parameter for a circuit, access the WCP Circuit Interfaces List window.

For information on accessing configuration windows, refer to "Accessing Configuration Windows" on page 3-2. For parameter descriptions, refer to Appendix A, "Data Compression Parameters."

Maximizing Throughput

Each side of the link has both a compression and decompression history and a lookup table. The *compression* and *decompression* histories maintain a record of data that has already traveled across the network. The *lookup tables* maintain pointers to redundant strings and the offset and length tokens that replace each of those strings.

You can specify either 8 KB or 32 KB of local memory to maintain a compression history. When you make this choice, be aware that you are allocating more memory than the History Size parameter value indicates.

Table 3-1 lists the amount of memory required that 8 KB and 32 KB history sizes use.

Table 3-1. Memory Allocations for Software Compression History

Memory Requirements	8 KB History Size	32 KB History Size
Compression history	8 KB	32 KB
Lookup table	16 KB	64 KB
Decompression history	8 KB	32 KB
Total memory required	32 KB	128 KB

If you select different values for history size for the two sides of the link, 8 KB becomes the history size for both sides of the link.

Hardware compression has similar requirements.

8 KB History Size

In general, 8 KB histories are appropriate for frame relay and X.25, when you have large numbers of VCs and need to be conservative when you allocate memory to each of them.

32 KB History Size

For PPP, with only one circuit per line, you may want to use a 32 KB history.

You may want to allocate a 32 KB history size for links with speeds higher than 64 Kb/s to improve throughput. The compressor can find a data pattern match up to three times faster using a 32 KB history than an 8 KB history.

History Size with Hardware Compression

Hardware compression daughterboards and net modules are available in 32 and 128 contexts. The numbers 32 and 128 assume a history size of 8 KB per context, although you can configure history size at either 8 KB or 32 KB. For example, if you configure history size at 32 KB, you have used four 8 KB contexts, and you have that many fewer contexts available to run hardware compression on your network.

Note: Although software compression does not put strict limits on the number of contexts you can configure, be aware that memory requirements for history size are the same for both software and hardware compression.

Both boards reserve one 8 KB context for PPC, as opposed to CPC. There is no limit to the number of VCs that can use this one PPC context. The maximum number of VCs for the compression engine is 256.

The compression hardware uses memory in units called *pages*, where a page equals 32 KB of memory. Each context that uses a 32 KB history uses one page of memory. Restrictions for CPC contexts using either 8 or 32 KB histories are that the memory used for any one history must be continuous, and it may not cross pages. For 8 KB contexts, these restrictions create few constraints, but for 32 KB contexts, they are significant.

Thirty-one CPC contexts each using an 8 KB history are possible on the 32 context board, and 127 contexts each using an 8 KB history are possible on the 128 context board.

Table 3-2 shows the maximum number of 8 KB contexts each board can support.

Table 3-2. Hardware Compression -- 8 KB Contexts

	Max 8 KB CPC Contexts	Available 32 KB CPC Contexts	Reserved 8 KB PPC Context
32 Context Board	31	0	1
128 Context Board	127	0	1

On a 32 context board, the maximum number of 32 KB contexts is 7, and on a 128 context board, the maximum number of 32 KB contexts is 31, because of the 8 KB of memory the one PPC context requires.

Table 3-3 shows the maximum number of 32 KB contexts each board can support.

Table 3-3. Hardware Compression -- 32 KB Contexts

	Max 32 KB CPC Contexts	Available 8 KB CPC Contexts	Reserved 8 KB PPC Context
32 Context Board	7	3	1
128 Context Board	31	3	1

You can mix 8 KB and 32 KB contexts on either board. Be aware that if you are bringing VCs up and down, memory may fragment. Even though you have 32 or more KB of compression memory available, if it is on different pages you will not be able to configure a 32 KB context. To solve this problem, save your configuration and reset the slot. When you reset the slot, available compression memory is rearranged to be contiguous.

If you have memory available, you are always able to add an 8 KB context, because 8 KB is the smallest divisible amount of compression memory.

Modifying the History Size

To maximize throughput, modify the History Size parameter.

To modify this parameter for the line, access the WCP Line Interfaces List window. To modify this parameter for a circuit, access the WCP Circuit Interfaces List window.

For information on accessing configuration windows, refer to "Accessing Configuration Windows" on page 3-2. For parameter descriptions, refer to Appendix A, "Data Compression Parameters."

Preventing Data Loss for PPP and Frame Relay

Buffer size is the amount of memory allocated to keep the transmission history. You must configure this parameter to protect against data loss if you run PPP or frame relay. You can use a buffer size of None, Normal, Large, or Very Large. The default value is Normal. Configure buffer space based on the following conditions:

- Length of time it takes for data to travel over the link.

  A Normal buffer size is usually enough for a coast-to-coast connection within the United States. You may need a Large or Very Large buffer if your link is over a satellite connection.

- Number of dropped packets.

  For a link with a large number of dropped packets, increase the buffer size. For a link with a very small number of dropped packets, decrease the buffer size, even to None, to conserve memory.

- Number of resets.

  For a link with a large number of resets and a low number of dropped packets, increase the buffer size. Be aware, however, that a high number of resets may occur for reasons unrelated to buffer size.

Note: X.25 is a reliable protocol, which means that it has features that check for errors and prevent data loss. Bay Networks data compression software ignores the Buffer Size parameter for X.25, so if you are configuring compression for X.25, you do not need to set this parameter.

Modifying the Buffer Size

To protect against data loss, modify the Buffer Size parameter. To modify this parameter, access the WCP Line Interfaces List window.

For information on accessing configuration windows, refer to "Accessing Configuration Windows" on page 3-2. For parameter descriptions, refer to Appendix A, "Data Compression Parameters."

Configuring Hardware Compression

There are two issues specific to hardware compression:

- Selecting a hardware compression engine
- Selecting a fallback compression mode

These two issues are explained in the next two sections.

Selecting Software or Hardware Compression Engines

When you configure a VC for compression, the default compression type varies depending on whether it is a link or net module, and depending on the type of router platform.

Table 3-4 shows the dependencies for the default compression type:

Table 3-4. Default Compression Type Dependencies

Module Type	Default Compression Type
Link module that does not support hardware compression	Software
Link module that supports hardware compression*	Hardware
Net module - except for an ASN	Software
Net module - ASN with a hardware compression net module	Hardware

* Refer to “Hardware Compression” on page 2-5.

You can use software compression even though you are using a hardware compression daughterboard or net module. Bay Networks recommends that you use hardware compression for connections greater than 512 Kb/s. You would also want to specify software compression for VCs in excess of the number of contexts your hardware compression daughterboard or net module can support.

Configure a VC to use software compression by setting the Engine Type parameter to Software.

Selecting Compression Engines

To determine the compression for this router, modify the Engine Type parameter. To modify this parameter for the line, access the WCP Line Interfaces List window. To modify the this parameter for a circuit, access the WCP Circuit Interfaces List window.

For information on accessing configuration windows, refer to "Accessing Configuration Windows" on page 3-2. For parameter descriptions, refer to Appendix A, "Data Compression Parameters".

Selecting a Fallback Compression Mode

Fallback compression mode is configurable on a line basis only. Use it to indicate the compression mode that you want to use when no hardware compression contexts are available.

The options are as follows:

- Software CPC -- a good choice for lower speed links, 64 Kb/s or less. It generally affords a better compression ratio than does Hardware PPC.
- Hardware PPC -- a good choice for higher speed links, greater than 64 Kb/s. It provides better throughput than does Software CPC.

Modifying the Fallback Compression Mode

To indicate the compression mode, modify the Fallback Compression Mode parameter. To modify this parameter, access the WCP Line Interfaces List window.

For information on accessing configuration windows, refer to "Accessing Configuration Windows" on page 3-2. For parameter descriptions, refer to Appendix A, "Data Compression Parameters."

Changing the Control and Compression Protocol

There are two PPP interface parameters that you can modify for compression, the CCP Type and the Compression Protocol. These parameters enable the router to operate with Bay Networks routers using BayRS router software prior to Version 12.10 and with non-Bay Networks routers.

Modifying the CCP Type enables a router operating with version 12.10 software to be compatible with routers running previous versions of software that negotiate WCP below the PPP multilink bundle.

Modifying the Compression Protocol lets you specify a particular protocol to use or instructs the router to negotiate which protocol to use.

For parameter descriptions, refer to Appendix A, “Data Compression Parameters.”

To modify these parameters, complete the tasks in the following table:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Protocols**.	The protocols menu opens.
2. Choose **PPP**.	The PPP menu opens.
3. Choose **Interfaces**.	The PPP Interface List window opens.
4. Set the **CCP Type** parameter. Click on **Help** or see the parameter description on page A-9.	Site Manager changes the parameter value.
5. Set the **Compression Protocol** parameter. Click on **Help** or see the parameter description on page A-10.	Site Manager changes the parameter value.
6. Click on **Done**.	You return to the Configuration Manager window.

Disabling Compression

You may want to temporarily disable compression on a line, then reenable it later.

Disabling WCP

To disable WCP, modify the Enable parameter. To modify this parameter, access the WCP Line Interfaces List window.

For information on accessing configuration windows, refer to "Accessing Configuration Windows" on page 3-2. For parameter descriptions, refer to Appendix A, "Data Compression Parameters."

Disabling Stac LZS

To disable Stac LZS, modify the Enable parameter. To modify this parameter, access the Stac LZS Interfaces List window.

For information on accessing configuration windows, refer to "Accessing Configuration Windows" on page 3-2. For parameter descriptions, refer to Appendix A, "Data Compression Parameters."

Deleting Data Compression from a Router

To delete compression from *all* circuits on the router, begin at the Configuration Manager window and complete the tasks in the following table:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Protocols.**	The Protocols menu opens.
2. Choose **WCP** or **Stac LZS.**	The WCP or Stac LZS menu opens.
3. Choose **Delete WCP** or **Delete Stac LZS**	Site Manager prompts: `Do you REALLY want to delete WCP? (or Stac LZS)`
4. Click on **OK.**	Site Manager returns you to the Configuration Manager window. Compression is no longer operating on the router.

Appendix A
Data Compression Parameters

This chapter includes parameter descriptions for data compression services.

WCP Line Interface Parameters

Use the following descriptions to set Bay Networks data compression line parameters. Notice that the Site Manager path for all line parameters is the same, as is the path for all circuit interface parameters. This means that you can edit all line parameters or all interface parameters at the same time.

Parameter:	**Enable**
Path:	Configuration Manager > Protocols > WCP > Lines
Default:	Enable
Options:	Enable | Disable
Function:	Enables or disables data compression on the line
Instructions:	WCP automatically sets this parameter to Enable when you select WCP in the Select Protocols window. If you want to temporarily disable WCP rather than delete it from the platform, set this parameter to Disable. To reenable WCP, reset it to Enable.
MIB Object ID:	1.3.6.1.4.1.18.3.4.22.1.1.2

Parameter:	**Compression Mode**
Path:	Configuration Manager > Protocols > WCP > Lines
Default:	Continuous Packet
Options:	Continuous Packet | Packet by Packet
Function:	Continuous Packet Compression (CPC) retains compression history across packets and allows a higher compression ratio than does Packet-by-Packet compression. Packet-by-Packet (PPC) compression resets compression history at the start of each packet, resulting in a lower compression ratio. Since PPC does not depend on previous packets, you should select this option for a link that drops a large number of packets.
Instructions:	Select either Continuous Packet or Packet by Packet.
MIB Object ID:	1.3.6.1.4.1.18.3.4.22.1.1.5

Parameter: History Size

Path: Configuration Manager > Protocols > WCP > Lines

Default: 32 K

Options: 32 K | 8 K

Function: Indicates the amount of memory allocated to compression history for the line. Remember that history size has separate compression and decompression histories and lookup tables on each side of a link.

If the link uses software compression with a history of 8 KB, each end of the link allocates a total of 32 KB as follows:

- 8 KB for compression
- 16 KB for a lookup table
- 8 KB for decompression

If the link uses a compression history of 32 KB, each end of the link allocates a total of 128 KB as follows:

- 32 KB for compression
- 64 KB for a lookup table
- 32 KB for decompression

Hardware compression has similar requirements.

Selecting 32 K for PPP WCP should not be a problem for the BN, because PPP allows only one circuit per single or multiple lines. Select 8 K or 32 K for frame relay and X.25 lines, depending on the resources of your network.

Selecting 32 K for PPP WCP on the ASN can cause problems, particularly if you are using a 32-context compression net module.

In general, 8 KB histories are appropriate for WAN links that run at 64 Kb/s or less, because less throughput is required. Use an 8 KB history size with frame relay and X.25, which have large numbers of VCs and may have low available bandwidth, and with PPP on a 32-context net module.

You may want to allocate a 32 KB history size for links with speeds higher than 64 Kb/s to improve throughput. The compression engine can find a data pattern match up to three times faster using a 32 KB history than an 8 KB history.

If you select different history sizes for each side of a link, the smaller of the two becomes the effective history size.

Instructions: Select either 32 K or 8 K.

MIB Object ID: 1.3.6.1.4.1.18.3.4.22.1.1.6

Parameter: **Buffer Size***

Path: Configuration Manager > Protocols > WCP > Lines

Default: Normal

Options: Very Large │ Large │ Normal │ None

Function: Indicates the amount of buffer memory for the transmission history on a line.

Instructions: Set this parameter according to the end-to-end round-trip length of a WCP connection:

Select Normal for most land-line, coast-to-coast connections.

Select Large or Very Large for connections at a great distance from each other, such as satellite connections.

Select None for links that drop a very small number of packets.

Increase the buffer size for a link with a large number of resets.

MIB Object ID: 1.3.6.1.4.1.18.3.4.22.1.1.7

* Because X.25 has features that check for errors and prevent data loss, Bay Networks data compression software ignores the Buffer Size parameter for X.25. If you are configuring compression for X.25, you do not have to set this parameter.

Parameter: **Engine Type**

Path: Configuration Manager > Protocols > WCP > Lines

Default: Software, unless you have configured either an Octal Sync link module that has a hardware compression daughterboard for the BN, or a hardware compression net module for the ASN, in which case the default is Hardware.

Options: Software │ Hardware

Function: Determines whether compression for this node will be software- or hardware-based.

Instructions: Select Software to use software-based compression or select Hardware to use hardware-based compression. You can use hardware compression with PPP and frame relay only. You can use software compression with PPP, frame relay, or X.25.

MIB Object ID: 1.3.6.1.4.1.18.3.4.22.1.1.8

Parameter:	**Fallback Compression Mode**
Path:	Configuration Manager > Protocols > WCP > Lines
Default:	Software CPC
Options:	Software CPC | Hardware PPC
Function:	This parameter is for hardware compression only. Use it to indicate the compression mode you want to use when no hardware compression contexts are available.
Instructions:	Select Software CPC or Hardware PPC. Software CPC is a good choice for lower speed links, 64 Kb/s or less. It generally affords a better compression ratio than does Hardware PPC. Hardware PPC is a good choice for higher speed links, greater than 64 Kb/s. It provides better throughput than does Software CPC. Refer to Chapter 1 for explanations of continuous packet and packet-by-packet compression modes.
MIB Object ID:	1.3.6.1.4.1.18.3.4.22.1.1.10

WCP Circuit Interface Parameters

Use the following descriptions to set Bay Networks data compression.

Parameter: Enable

Path: Configuration Manager > Protocols > WCP > Interfaces

Default: Enable

Options: Enable | Disable

Function: Enables or disables data compression on the line

Instructions: WCP automatically sets this parameter to Enable when you select WCP in the Select Protocols window. If you want to temporarily disable WCP rather than delete it from the platform, set this parameter to Disable. Reset it to Enable to reenable WCP.

MIB Object ID: 1.3.6.1.4.1.18.3.4.22.2.1.2

Parameter: Compression Mode

Path: Configuration Manager > Protocols > WCP > Interfaces

Default: Inherit from Line

Options: Continuous Packet | Packet by Packet | Inherit from Line

Function: Indicates the compression mode on the circuit.

Continuous Packet Compression (CPC) retains compression history across packets and allows a higher compression ratio than does Packet-by-Packet Compression (PPC).

Packet-by-Packet Compression (PPC) resets compression history at the start of each packet, resulting in a lower compression ratio. Since PPC does not depend on previous packets, you should select this option for a link that drops a large number of packets.

Inherit from Line allows you to set WCP parameters at the line level and apply them to circuits. For PPP, with only one circuit per line, this means that you can configure WCP at either the circuit level or the line level.

Instructions: Select Inherit from Line if you want to accept the value in effect for the WCP Compression Mode line parameter. Otherwise, select either Continuous Packet or Packet by Packet.

MIB Object ID: 1.3.6.1.4.1.18.3.4.22.2.1.4

Parameter: History Size

Path: Configuration Manager > Protocols > WCP > Interfaces

Default: Inherit from Line

Options: 32 K │ 8 K │ Inherit from Line

Function: Indicates the amount of memory allocated to compression history for the line. Remember that history size has separate compression and decompression histories and lookup tables on each side of a link. If the link uses a compression history of 8 KB, each end of the link allocates a total of 32 KB as follows:

- 8 KB for compression
- 16 KB for a lookup table
- 8 KB for decompression

If the link uses a compression history of 32 KB, each end of the link allocates a total of 128 KB as follows:

- 32 KB for compression
- 64 KB for a lookup table
- 32 KB for decompression

Hardware compression has similar requirements.

Selecting 32 K for PPP WCP should not be a problem for the BN, because PPP allows only one circuit per single or multiple lines. Select 8 K or 32 K for frame relay and X.25 lines, depending on the resources of your network. Selecting 32 K for PPP WCP on the ASN can cause problems, particularly if you are using a 32-context compression net module.

In general, 8 KB histories are appropriate for WAN links that run at 64 Kb/s or less, because less throughput is required. Use an 8 KB history size with frame relay and X.25, which have large numbers of VCs and may have low available bandwidth, and with PPP on a 32-context net module. You may want to allocate a 32 KB history size for links with speeds higher than 64 Kb/s to improve throughput. The compression engine can find a data pattern match up to three times faster using a 32 KB history than an 8 KB history. If you select different history sizes for each side of a link, the smaller of the two becomes the effective history size.

Inherit from Line allows you to set WCP parameters at the line level and apply them to circuits.

Instructions: Select Inherit from Line if you want to accept the value in effect for the WCP History Size line parameter. Otherwise, select either 32 K or 8 K.

MIB Object ID: 1.3.6.1.4.1.18.3.4.22.2.1.5

Parameter: **Engine Type**

Path: Configuration Manager > Protocols > WCP > Interfaces

Default: Inherit from Line

Options: Software │ Hardware │ Inherit from Line

Function: Determines whether compression for this node will be software- or hardware-based.

Instructions: Select Inherit from Line if you want to accept the value in effect for the WCP Engine Type line parameter. Otherwise, select Software to use software-based compression or select Hardware to use Hardware-based compression.

You can use hardware compression with PPP and frame relay only. You can use software compression with PPP, frame relay, or X.25.

MIB Object ID: 1.3.6.1.4.1.18.3.4.22.2.1.6

Stac LZS Parameter

Use the following parameter description to enable Stac LZS compression.

Parameter: **Enable**

Path: Configuration Manager > Protocols > Stac LZS > Interfaces

Default: Enable

Options: Enable │ Disable

Function: Enables or disables Stac LZS compression on this interface.

Instructions: Site Manager automatically sets this parameter to Enable when you select Stac LZS as the compression protocol. If you want to temporarily disable Stac LZS rather than delete it from the router, set this parameter to Disable. To reenable Stac LZS, reset it to Enable.

MIB Object ID: 1.3.6.1.4.1.18.3.4.22.6.1.2

PPP Interface Parameters for Compression

There are two PPP interface parameters for data compression. You can find them by scrolling through the PPP Interfaces List window. For more information about PPP, refer to *Configuring PPP Services*.

The PPP parameters for compression are as follows:

Parameter: CCP Type

Path: Configuration Manager > Protocols > PPP > Interfaces

Default: CCP

Options: ILCCP | CCP

Function: Specifies the compression control protocol the router uses for this interface.

Instructions: Accept the default, CCP, if you select Stac LZS as the compression protocol, or if you select WCP as the compression protocol and you set the PPP Mode parameter to multilink. Using CCP as the compression type means that the router negotiates compression above the multilink bundle.

Select ILCCP if you are configuring a new circuit and you set the PPP Mode parameter to multilink, and the remote router is using software prior to Version 12.10. Using ILCCP as the compression type means that the router will negotiate compression below the multilink bundle.

If you have a Bay Networks 12.10 router using an older configuration file, the routers negotiate WCP below the multilink bundle by default. You can change this to CCP for the routers at both ends of the link to negotiate WCP above the multilink bundle.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.2.1.71

Parameter: Compression Protocol

Path: Configuration Manager > Protocols > PPP > Interfaces

Default: Any

Options: Any | WCP | Stac LZS

Function: Specifies the compression protocol the router uses for this interface.

Instructions: Accept the default, Any, if you want the router to automatically select the compression protocol that is compatible with the remote router, as follows:

- If the remote router can use either WCP or Stac LZS, the router selects WCP, for example, if both ends of the connection are Bay Networks routers.
- If the remote router does not use WCP, but uses Stac LZS, the router selects Stac LZS. Conversely, if the remote router does not use Stac LZS, but uses WCP, the router selects WCP.
- If the remote router does not recognize either WCP or Stac LZS, then CCP does not complete negotiations and the router will not compress data.

Select WCP as the compression protocol if the remote router is a Bay Networks router.

Select Stac LZS as the compression protocol if the remote router is not a Bay Networks router.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.2.1.72

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